

**Amendments to the Claims**

This listing of claims will replace all prior versions, and listings, of claims in the application.

**Claim Listing:**

1-25. (canceled)

26. (previously presented) A composition for tagging objects, comprising:  
a population of nanocrystals comprising two or more subsets of  
nanocrystals, the population characterized by a unique spectral code;  
wherein each said subset comprises a plurality of quantum dots of the  
same size and/or the same composition;  
wherein the unique spectral code of the population comprises at least one  
optical property defined by the interaction of optical properties of at least two of the two  
or more subsets of nanocrystals, wherein the interaction is other than the excitation  
wavelength of a first nanocrystal subset exciting a second nanocrystal subset.

27. (Original) The composition of claim 26, wherein the nanocrystals  
comprise: a semiconductor, a nanodot, a nanorod, a nanowire, a nanocrystal, a branched  
nanorod, a coated nanocrystal, a passivated nanocrystal, or a derivitized nanocrystal.

28. (Original) The composition of claim 26, wherein the nanocrystals  
further comprise a diameter ranging from about 1000 nm to about 0.1 nm.

29. (Original) The composition of claim 28, wherein the nanocrystals  
further comprise a diameter ranging from about 50 nm to about 15 nm.

30. (previous presented) The composition of claim **27**, wherein the derivitized nanocrystals comprise a linking agent selected from the group consisting of a substituted silane, a diacetylene, an acrylate, an acrylamide, vinyl, styryl, silicon oxide, boron oxide, phosphorus oxide, N-(3-aminopropyl)3-mercapto-benzamide, 3-aminopropyl-trimethoxysilane, 3-mercaptopropyl-trimethoxysilane, 3-maleimidopropyl-trimethoxysilane, 3-hydrazidopropyl-trimethoxysilane, a hydroxysuccinimide, a maleimide, a haloacetyl, a pyridyl disulfide, a hydrazine, and ethyldiethylamino propylcarbodiimide.

31. (previously presented) The composition of claim **27**, wherein the coated nanocrystals comprise an inner core and a coating layer of semiconductor comprising a band gap greater than that of the core.

32. (Original) The composition of claim **31**, wherein the nanocrystals comprise AlAs, AlN, AlP, AlSb, CdO, CdS, CdSe, CdTe, GaAs, GaN, GaP, GaSb, HgO, HgS, HgSe, HgTe, InAs, InN, InP, InSb, MgS, MgSe, ZnO, ZnS, ZnSe, or ZnTe.

33. (Previously Presented) The composition of claim **31**, wherein the nanocrystals comprise ZnS, ZnSe, ZnTe, CdS, CdSe, CdTe, GaN, GaP, PbTe, HgS, HgSe, HgTe, CdTe, GaAs, GaSb, InP, InAs, InSb, AlS, AlSb, PbS, PbSe, Ge, or Si.

34. (previously presented) The composition of claim **26**, wherein the two or more subsets of nanocrystals comprise different light emission wavelengths.

35. (previously presented) The composition of claim **26**, wherein at least one said subset of the population of nanocrystals emits light with a spectral width from less than about 25 nm to about 30 nm.

36. (Original) The composition of claim **26**, wherein the nanocrystals are manufactured by colloidal synthesis, precipitation, monolayer self assembly, photolithography, VLS growth, gas-phase nucleation and growth, solution-phase nucleation and growth, or vapor deposition.

37. (previously presented) The composition of claim **26**, wherein the unique spectral code of the population comprises an excitation spectrum for the population of nanocrystals comprising ultraviolet, visible, and/or infrared wavelengths.

38-39. (canceled)

40. (previously presented) The composition of claim **26**, wherein the unique spectral code of the population comprises an emission spectrum for the population of nanocrystals comprising ultraviolet and/or infrared wavelengths.

41. (previously presented) The composition of claim **26**, wherein at least one said subset of nanocrystals comprises a predetermined intensity of emission at a certain wavelength.

42. (Original) The composition of claim **41**, wherein the intensity is predetermined by varying a concentration of a nanocrystal constituent, the presence of an overcoating, or by varying representation of the nanocrystal subset.

43. (Canceled)

44. (previously presented) The composition of claim **26**, wherein the spectral code comprises a predetermined excitation spectrum or emission spectrum.

45. (Original) The composition of claim **44**, wherein the spectra are predetermined by varying a size of a nanocrystal, a constituent semiconductor, a size-distribution of the nanocrystals, a composition of a nanocrystal, a polarization of a nanocrystal, or a concentration of a nanocrystal constituent.

46. (Canceled)

47. (Original) The composition of claim **26**, wherein the composition is excitable or detectable through a barrier.

48. (Original) The composition of claim **47**, wherein the barrier comprises living tissue, organic tissue, vegetation, animals, smoke, screens, dust, plastics, clouds, rain, water, a fabric, a material that transmits nonvisible light, or visibly obscured lines of sight.

49-59 (Canceled)

60. (Previously presented) The composition of claim **26**, wherein the population of nanocrystals is linked to an adherent matrix, which adherent matrix comprises an affinity molecule or an antibody.

61. (Previously presented) An object tagged with the composition of claim **26**.

62. (previously presented) The composition of claim **26**, wherein the population of nanocrystals is disposed in or linked to an adherent matrix.

63. (Previously presented) The composition of claim **62**, wherein the adherent matrix comprises a polymer, a penetrant, a solid support, a glass, a crystal, an organic material, an inorganic material, a liquid tape, a fiber, a patch, a capsule, a powder, a decal, a pin, a clip, a label, ink, or an adhesive.

64. (previously presented) The composition of claim **26**, wherein the interaction comprises interaction between the emission wavelength of at least the first said subset and the excitation wavelength of at least the second said subset.

65. (previously presented) The composition of claim **26**, wherein the interaction comprises interaction between the emission frequency of at least the first said subset and the emission frequency of at least the second said subset.

66. (previously presented) The composition of claim **26**, wherein the interaction comprises interaction between the emission intensity of at least the first said subset and the emission intensity of at least the second said subset.

67. (currently amended) A composition for tagging and detecting solid material objects other than molecules, biomolecules, chemical elements, and chemical compounds, comprising:

a population of nanocrystals comprising two or more subsets of nanocrystals that emit light when excited, wherein the population has a unique spectral code, the spectral code comprising the excitation and emission spectra of the population upon excitation with one or more select excitation wavelengths;

wherein the unique spectral code further comprises one or more geometric shapes formed by the emission of at least one said nanocrystal subset, wherein the geometric shape corresponds to the configuration of the at least one nanocrystal subset.

68. (currently amended) The composition of claim 67, wherein the ~~objects are solid material objects selected from the group consisting of: retail items, manufactured goods, animals, grains, powders, and vehicles~~ geometric shape is invisible to the naked eye at least while the composition is not excited.

69. (currently amended) A composition for tagging and detecting objects comprising:

a population of nanocrystals comprising two or more subsets of nanocrystals, the population comprising a unique spectral code;

wherein the unique spectral code comprises one or more predetermined excitation wavelengths and a corresponding emission profile for the population of nanocrystals;

wherein the unique spectral code further comprises one or more predetermined variations in at least one emission property of the population ~~corresponding to multiple predetermined excitation and/or emission polarization angles.~~